

REMARKS

The Office Action of February 25, 2009 has been carefully studied. In response thereto, claim 1 is amended and claims 8-15 are added.

Claim 1 is amended by requiring the core to consist essentially of an acidic crystallized microporous solid having a size between 0.5 micron and 20 microns, support being found on page 5, last line of the specification as well as on page 5, line 21. In addition, the claim specifies that the external layer of each grain is a crystallized amorphous solid as set forth in original claim 5. Still further, claim 1 is amended by requiring that the external layer of the grains have an overall average thickness of between 0.1 and 10 microns, as supported by page 8, lines 13-14 of the specification. By combining twice the thickness of the external layer, assuming a top and a bottom of the grain, and a maximum size of the core of 20 microns, the maximum average grain size is about 40 microns.

In view of the incorporation of the above details into claim 1, claims 4 and 5 are cancelled.

New claim 8 requiring N to be 100 is supported by page 3, last complete paragraph of the specification. Claims 9 and 10 which define the uniformity criterion C of being less than 0.2 or less than 2.1 respectively is supported by page 4, last paragraph of the specification.

Claims 11 and 12 mirror claim 8 but are dependent on claims 9 and 10 respectively.

Claim 13 is similar to claim 2 but is dependent on claim 12 with the value of the extent of surface covering being changed from 95% to 99%, as supported by page 5 of the specification.

Claims 14 and 15 are supported by working examples 1 and 2.

Claims 16 and 17 mirror claim 6 but with smaller upper limits for the range of the diameter of the pores in the microporous solid, as supported by page 7, lines 5 and 6 of the specification.

It is believed that the amendment to claim 1 clearly points out the novelty and unobviousness of Applicants' invention as opposed to the cited prior art. In support of this contention, the following discussion of the references is courteously presented for the Examiner's consideration.

Koster et al. U.S. 6,872,865

This reference discloses a layered crystalline metallosilicate composite having a zeolitic aluminosilicate core of MFI, EUO, MEL, MFS, MTW, TON and MCM-22 with a mantle comprising a crystalline metallosilicate containing a framework metal capable of forming stable +3 ions, preferably selected from one or more of B, In, Ga and Fe. The zeolite alumina silicate core is set forth as being in the form of spherical particles, with the only specific dimensions regarding the average diameter of such particles being found on column 7, lines 63-66 as being from about 0.2 to 0.8 mm which is the same as 200-800 microns.

It is appreciated that on column 14, lines 2-7 of the reference, there is a discussion of the size of the crystals in the micrographs of Figures 3 and 4. However, the micrograph of composite X is that of Example 1 which is indicated to be a prior art composite and constitutes only a core, i.e. no layer on the core, with the crystals being of a size of about 1 micron or less. The micrographic composite A is indicated in the reference to show many crystals the size being well in excess of 1 micron. Inasmuch as the minimum value set forth in the specification for the average diameter of the spherical particles is 200 microns, and a core is indicated as being about 1 micron, the layer on the core would be about 100 microns or 10 times Applicants' maximum average thickness of the external layer of 10 microns.

Not only is Applicants' thickness of the external layer unobvious, but also the uniformity of the layer. This uniformity is important to Applicants' invention and is set forth as less than 0.30 in claim 1, less than 0.2 in claim 9 and less than 0.1 in claim 10. There is nothing in the reference which addresses uniformity, much less the need for uniformity or the particular values of uniformity which Applicants claim.

Stockwell et al. 5,082,814

The basic teaching of this patent is to provide an external coating around a zeolite so as to protect the zeolite from poisoning, especially by nickel during an FCC process. Accordingly, the external coating is an anhydrous refractory or precursors thereof of sufficient thickness to protect the core zeolite. In contradistinction, Applicants' catalyst is provided with an external layer

which is a crystallized microporous solid, or as indicated in claim 7, 14 and 15 zeolites. Consequently, one of ordinary skill in the art would find the teachings of this patent to be irrelevant to Applicants' invention because of the diametrically opposite types of external layers which are employed. Furthermore, Applicants' maximum size of the grains of the catalyst is about, on average, about 40 microns. In contradistinction, the average diameter of the microspheres set forth in the reference is about 60-80 microns (column 5, lines 31-33), another distinguishing characteristic which leads one of ordinary skill in the art away from Applicants' invention. As for the thickness of the protective layer in the reference, it is stated that it is important that there is no indication of the range of thicknesses, much less the requirement for a uniform thickness having a particular uniformity criterion C which is less than 0.30 in claim 1 and less than 0.2 and 0.1 in claims 9 and 10. Accordingly, this reference is not relevant to Applicants' invention, and if anything, common sense would dictate that one of ordinary skill in the art would ignore the possibility of combining this reference with the teachings of Koster et al.

***Twaiq et al. (Fuel Processing Technology, 85 (2004) pages 1283-1300),
available on line, December 2003***

This reference discloses a composite material containing an inner core of zeolite ZSM-5 covered with a layer of a mesoporous molecular sieve. To the contrary, the catalyst of present claim 1 is made of an inner core covered with a layer of crystallized microporous solid. The diameter of the pores of the microporous layer are specified in greater detail in claims 6, 16 and 17.

As for the thickness of the external layer, it is not seen that there is any disclosure of the importance of uniformity and the quantitative criteria set forth in Applicants' claims. Furthermore, Applicants do not comprehend any teaching in this reference which relates to a core having a size of about 0.5 micron to about 20 microns and an external layer of between 0.1 and 10 microns.

As for Table 4 cited by the Examiner, it is not apparent that it indicates any specific thickness but only ratios: mesophase/zeolite. The first number W in the parenthesis CMZ(W,Y) is not sufficient for disclosing a uniform thickness of the external layer. Moreover one cannot

deduce a direct relation between the thickness of the external layer and performance since parameter W is not the only one which varies but also the ratio Si/Al as well as S_{BET} (see Table 4 and the comments below Table 4).

Combination Of References

In view of the disparate teachings of the cited references and the fact that even if they were artificially combined, they do not provide the values of important parameters presently set forth in claim 1 regarding the size of Applicants' grains and mesoporous layers much less the requisite uniformity required by the claim. If anything, they teach away from the invention. Accordingly, it is courteously submitted that the unobviousness of Applicants' presently claimed invention is sufficient to enable the Examiner to allow claim 1.

Dependent Claims

With respect to those dependent claims which have not been specifically addressed herein, such as claims 14 and 15 drawn to Examples 1 and 2, it is clear that such dependent claims provide even greater unobviousness to Applicants' invention. So as not to burden the record, however, Applicants will not comment in detail about such dependent claims but reserve the right to provide rebuttal statements at a later date if ever necessary.

In view of the above remarks, favorable reconsideration is courteously requested. However, if there are any residual issues which can be expeditiously resolved by a telephone conference, the Examiner is courteously invited to telephone Counsel at the number indicated below. If Counsel is unavailable, please telephone Ms. Richardson at 703-812-5326 and she will be happy to enlist the services of another attorney.

The Commissioner is hereby authorized to charge any fees associated with this response or credit any overpayment to Deposit Account No. 13-3402.

Respectfully submitted,

/I. William Millen/

I. William Millen, Reg. No. 19,544
Attorney/Agent for Applicant(s)

MILLEN, WHITE, ZELANO
& BRANIGAN, P.C.
Arlington Courthouse Plaza 1, Suite 1400
2200 Clarendon Boulevard
Arlington, Virginia 22201
Telephone: (703) 243-6333
Facsimile: (703) 243-6410
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